SELECTED DISASTER SUMMARY

National Fire Coordination Study

U.S. DEPARTMENT OF AGRICULTURE/FOREST SERVICE/DIVISION OF FIRE CONTROL

SELECTED DISASTER SUMMARY

-Significant Lessons From Actual Experiences-

A Working Paper Prepared

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INTRODUCTION

The analytical results of Phase One[1/] of the National Fire Coordination Study show that a nuclear attack on the United States could create disasters of proportions previously unknown to the American people. Serious disasters occurring in the form of explosions, floods, fires, hurricanes, and earthquakes currently present the most severe test to the public services and citizens who would have to cope with the nuclear disaster should an enemy attack occur. Associated with each serious disaster, as would be the case in a nuclear disaster, are efforts to save lives, reduce property damage, and recover from the disaster as rapidly as possible. Some important lessons can be learned from real-life experiences in coping with a large disaster that will help in reducing the fire threat resulting from a nuclear disaster. The peacetime disasters that have occurred in the past differ from a nuclear disaster primarily in size, number of areas affected simultaneously, and the possible occurrence of radioactive fallout.

Reports have been prepared on most of the large disasters experienced in the past. These reports summarize strengths and weaknesses of the disaster management effort, and provide lessons from which to learn in the future.

1/ Phase One Report, NFCS, by W. R. Moore, J. W. Jay, and J. H. Dieterich. May 1965

OBJECTIVES

The objective of this report is to summarize the significant lessons to be learned from the 15 reports on 12 separate disasters and make it convenient to use these findings for planning during Phase Two of the NFCS.

The 12 disasters reviewed were:

1. Texas City Explosion, April 1947
2. New England Fires, October 1947
3. Malibu Fires, California, December 1956
4. Madison River Earthquake, Montana, August 1959
5. Hurricane Carla, September 1961
6. Vaiont Dam Disaster, Italy, October 1963
7. Medina AEC Base Explosion, Texas, November 1963
8. Los Angeles Fires, March 1964
9. Alaskan Earthquake, March 1964
10. Coyote Fire, California, September 1964
11. Hurricane Dora and Cleo, September 1964
12. Aircraft Crash Explosion, Wichita, Kansas, January 1965

SIGNIFICANT LESSONS

Included in the Appendix of this report are the summaries of each disaster incident and the significant lessons from each that relates to an improved system of fire defense. In this section, the significant points extracted from the 15 disaster reports are grouped by functions that are common to large fire emergencies. Some interpretation was done by the analyst to relate various points to a nuclear fire situation. Organized in this way, these points can be used more effectively as reference material during subsequent planning during Phase Two of the NFCS.

PLANNING

All cities should have a complete Disaster Plan that utilizes all relief agencies, public services, medical facilities, civil officials and military authorities. A successful disaster plan requires pre-planning, organizing, training, and frequent review and updating. The plan should be flexible enough to handle disasters somewhat larger than might be expected and planning should start at the local level and work upward.

A community prepared to at least partially cope with a nuclear disaster is well prepared to react to most natural disasters.

Plans should include some provisions for utilizing citizens volunteer help during periods of disaster.

Disaster planning should provide for an immediate response by emergency service units even before emergency control headquarters are established.

CITIZEN ACTION

Citizen volunteers responded quickly to help handle hose during the Wichita plane crash fire emergency. In another disaster, independent action by individuals was successful in helping with search and rescue, evacuation, security, emergency feeding, and registration. Plans should be made to utilize this important resource. An organized citizen rescue and fire reserve force, properly trained and equipped, can be useful during disaster situations.

Citizens will respond promptly and willingly to a disaster warning if they have confidence in the intelligence information on which the warning is based and the officials issuing the warning. Citizens reacted positively to the warnings for Hurricane Dora and Cleo and few deaths and injuries resulted.

Public reaction to a disaster cannot be easily predicted. Curious individuals by the hundreds may foolishly converge on the scene of the disaster completely disregarding their own safety.

COMMAND AND CONTROL

In the Dora hurricane emergency, the State CD office and the local CD offices utilized the Florida NAWAS Circuit to exchange information and an alternate headquarters was manned in case the main headquarters was put out of service. Mobile equipment may be the only equipment in use immediately following an earthquake, hurricane, or nuclear disaster.

Close liaison must be maintained between command and the utility companies to insure maximum utilization of available utilities.

There must be a central location where all disaster information can be channeled until the EOC is established. As quickly as possible, available information must reach the hands of those that can use it.

In the Alaskan Earthquake, the state CD Director was instructed by the Governor to coordinate activities of state officials at the state level. At the local level, the Mayor, City Manager, and Anchorage CD Director each had specific jobs. The CD Director coordinated emergency actions for the City Manager from an emergency EOC, housing all top city officials.

Command responsibilities must be clear-cut for disaster situations, and in spite of backup by Federal and state resources, the final responsibility for decisions affecting citizen's lives falls upon the local official.

On-the-ground command of the Hebgen Lake Earthquake Disaster was assigned to one agency (USFS), and the State CD Director was designated as State Coordinator by the Governor.

For handling multi-state disasters a disaster coordinator will need to be selected from available civil authorities, and have the support of the authorities in the other involved states. Central command of this type can more fully utilize the available resources for handling the disaster.

COMMUNICATIONS

Key EOC's should have an alternate power source for maintaining communications during an emergency. As a prerequisite for obtaining matching CD funds for communications equipment, a two-week supply of fuel for the emergency generators must be maintained. Mobile communication equipment and messengers may be the only means of exchanging information early in the disaster. Amateur radio groups (RACES) should be encouraged to participate in early establishment of communications.

In the Alaskan Earthquake, the first civilian situation report to the Pentagon came through the Alaska NAWAS Offices located at an airbase. The NAWAS Officer was receiving information from a mobile RACES monitor just outside his door, who was in turn in contact with Anchorage and State CD headquarters through other mobile RACES units.

In hurricane Carla, CD communications at both the state and local levels were considered adequate. The Federal CD communications system would have been inadequate to handle a load much larger than Carla. As a result of this disaster, local officials recommended the establishment of a command communications net to connect the State CD headquarters to area and local offices for use as an "executive" net - no bulk messages. This would be similar to a proposed disaster communications network for fire control designed to better utilize men and equipment from many jurisdictions.

Commercial broadcasting facilities can be used to keep the public informed if adequate preparations are made to insure a continued source of available power.

MILITARY ASSISTANCE

In all instances, except one, where the Military units were used, they were assigned to the disaster to work in support of the civil authorities. The only exception was the Vaiont Dam Disaster in Italy where the Military reluctantly took over command when civil authorities apparently refused the responsibility.

To make the best utilization of available Military resources close liaison must be maintained between all Military units, civil authorities, and operating CD personnel. Local pre-attack planning for enemy attack should consider precommitting National Guard or other Military units to specific communities.

In the Alaskan Earthquake, the State Adjutant General worked directly with State CD headquarters and relayed requests for aid to Army, Air Force, and Navy units. Liaison was established at the Anchorage CD headquarters.

EMERGENCY UTILITIES

Public utility companies can provide a large variety of services and equipment to aid in handling disasters. While the companies generally have no legal liability to furnish service to their customers in the event of a natural disaster, (and probably a wartime disaster as well) they

generally do their best to restore service as quickly as possible and should therefore be represented at community or area pre-emergency planning sessions.

During the early stages of any disaster, close liasion should be maintained between the utility crews and central command to insure the quickest reestablishment of interrupted service.

Restoring utilities lost during a nuclear disaster would be complicated with the advent of fallout. This is why provisions must be made to insure the use of emergency utilities until effective recovery work on the outside can be accomplished.

EQUIPMENT INVENTORY-AVAILABILITY

Disaster planning should include provisions for identifying and locating the equipment and materials that are likely to be in short supply when the emergency occurs. This would include CD and Military stockpile as well as available community resources.

In Hurricane Carla pre-arrangements were made to secure local heavy equipment in large amounts for cleanup and recovery. The plan was designed for use following an enemy attack and worked well in this natural disaster. This could be done for trucks, aircraft, etc.

In a large fire disaster, equipment and fire forces from nearby areas both urban and rural, may become seriously depleted at a time when weather conditions are most critical. A single pumper unit may provide

adequate protection for a single dwelling but if the number of dwellings exposed to fire exceeds the available pumpers, losses should be expected.

A complete up-to-the-minute inventory of personnel and equipment, in use and available, is needed. Auxiliary water sources should be developed and identified for disaster use.

EVACUATION AND RESCUE

Orderly evacuation to shelters, or out of an exposed area, depends upon a reliable warning and information system, and the complete cooperation of the citizens involved. Independent action by individuals acting under organized leadership can be effective in helping with search, rescue, and evacuation, as well as other activities.

Experience indicates that some evacuees may return to disaster areas prematurely. Under conditions of nuclear fallout this could of course be fatal.

In Hurricane Carla, the decision to evacuate was left up to the local officials with advisory support from the Weather Bureau. Accurate weather forecasts were helpful in preparing for evacuation just as they would be helpful in predicting fallout for evacuation purposes. Regarding a nuclear emergency, both state and local officials suggested evacuation plans to handle (a) strategic evacuation during international stress, (b) tactical evacuation of fallout areas if shelter is lacking, and (c) evacuation of survivors from target areas after an attack.

INFORMATION SERVICES

Pre-emergency disaster planning must provide for a reliable means of keeping the public informed of developments and changes, both within the disaster area and in surrounding areas. The most important media for this service are commercial radio stations that can transmit official reports and messages on emergency power to citizens having transistor radio equipment. Television and newspapers are perhaps of less importance in the early stages of the disaster and these services can be restored as conditions permit.

GENERAL

Fires do not always occur with natural disasters. There was only one minor fire in Anchorage the night after the quake, although other smaller towns experienced some severe fires due to ruptured oil tanks. In Anchorage, water was out of the lines and major fires would have been difficult to control.

In two of the disasters suggestions were made concerning the need for a more adequate system for handling registration and disposition of the disaster casualties, particularly the dead.

Where wildfires are common, zoning regulations that limit building of structures to certain general areas might reduce the damage to structures and wildland.

Statewide mutual aid arrangements (as in California) provides the best basis for handling fire disasters. Certain elements of this mutual aid would be useful in other natural disasters or during wartime emergencies.

The Office of Emergency Planning is the Federal Agency in charge of peacetime disaster relief. When a "major disaster" is declared by the President in response to a request from a Governor, the OEP is authorized to direct and coordinate assistance by other Federal agencies, and to administer funds allocated from the President's Disaster Fund. The OEP attempts to assign specific missions to individual agencies consistent with their day-to-day responsibilities.

APPENDIX

A. Texas City, Texas, Disaster, by Fire Prevention and Engineering Bureau of Texas and the National Board of Fire Underwriters, April 16 & 17, 1947

Summary of Event:

Two explosions, occurring aboard cargo ships in the dock area of Texas City, Texas, caused $30-40 million property damage and killed nearly 600 people. The explosions occurred nearly 12 hours apart on ships loaded with ammonium nitrate. All the Texas City fire equipment and much of the personnel in the fire department were killed by the initial explosion while they were fighting the fire aboard a cargo ship. Fire throughout the city was not a major problem - the major damage resulted from the effects of the blast.

Significant Lessons:

1. All cities and port facilities should have a complete Disaster Plan that utilizes all relief agencies, public services, medical facilities, civil officials, and Military authorities.

2. Disaster Plan should anticipate the worst possible disaster at any one location. Consider fire, hurricanes, tornadoes (and possibly a nuclear attack).

B. Some Lessons Taught by the New England Disaster, by Roi B. Woolley, Fire Engineering, December 1947

Summary of Event:

Forest fires throughout most of October 1947 spread across New England causing several million dollars worth of damage, destroying homes and businesses and taking the lives of at least 15 people. Many more were injured. The state of Maine was hardest hit with damage totaling nearly $30 million.

Significant Lessons:

1. There were no disaster preparedness plans or programs on the scale to cope with the situation that ultimately developed in the New England states.

2. Both short and long range preparedness plans for major fires or other disasters should start at the local level but anticipate problems that might develop over a number of states.

3. State representatives prepared a program to meet major disasters that was presented to the state governors for approval and adoption.

4. Confusion and lack of command during the fire emergency was attributed to the failure of municipal and community fire forces to team-up with the state forestry and other services. This was particularly true in Maine - less true in Massachusetts where mutual aid arrangements were in operation.

5. Command and coordination should be based upon predetermined authority or authorities. For disasters within a state the coordination rests with the Governor. For multi-state disasters, there must be a "coordinator of coordinators, a general of the forces." Probably civil, not Military or Federal.

6. Mutual aid arrangements provide the best basis for handling fire disasters. Operate from a central headquarters to move men and equipment. Statewide mutual aid (as in California) might be desirable.

7. A complete, up-to-the-minute inventory of firefighting equipment was needed throughout the disaster period but was not available.

8. Communications inadequate due to burned utility poles - inadequate radio equipment and no organized systematic use of short-wave radio.

9. The use of commerical broadcasting facilities should be included in New England disaster planning to make the best use of this facility.

10. Pickup firefighters should have been given some brief instructions to make them more effective.

11. There was a general equipment shortage, and hose thread adapters were needed but not readily available to make the hoses of various organizations interchangeable.

12. In areas where rural and urban areas are in close association (New England States) firefighters should have some training in both urban and wildland firefighting.

13. Natural water supplies should be developed and plans made for their use during emergencies.

14. In planning for major disasters, the use of air transportation should be given full attention. Aircraft were useful, supplementary tools in this fire disaster.

C. The Malibu Fires, December 26-30, 1956 by National Board of Fire Underwriters and Board of Fire Underwriters of the Pacific. Special Report. Undated.

Summary of Event:

> Three major brush fires, occurring within a 2 1/2 day period in late December 1956, burned numerous homes and property in an area 10-20 miles west of Los Angeles, and destroyed more than 37,000 acres of brush and land cover. Weather conditions were critical and there were many other brush fires starting that taxed the resources of the regular fire-fighting agencies. At least 17 separate jurisdictions responded to the fires coming from as far as 300 miles.

Significant Lessons:

1. Fires starting in natural ground fuels and brush during adverse weather conditions can assume conflagration proportions before firefighting can ever begin.

2. Selective fire control on structures may be done at the expense of overall control of the fire. It may be necessary to sacrifice watersheds to save buildings or vice versa.

3. Large rural fires, such as the Malibu Fires, require a larger commitment of men and resources for a longer period of time than all but the largest of municipal or urban conflagrations.

4. Fire forces in nearby urban areas were seriously depleted at a time when weather conditions were most critical.

5. A common disaster communications network would be useful in more complete utilization of men and equipment from the many jurisdictions.

6. Command training is needed for personnel from all agencies that expect to operate under mutual aid arrangements to establish a common understanding of policies and procedures.

7. Undisturbed natural fuels adjacent to structures makes it difficult to protect the building from a fire.

8. Zoning regulations, limiting the building of structures to certain general areas, might reduce the amount of damage to both homes and wildland.

9. Roads and firebreaks are of limited effectiveness under extreme weather conditions.

10. When the number of homes exposed to fire exceed the available pumper units, losses should be expected.

D. Hebgen Lake - Madison River Earthquake Disaster, by Charles L. Tebbe, Regional Forester, Forest Service, Region One, Missoula, Montana, August 1959

Summary of Event:

On August 17, 1959, at 11:35 p.m., a severe earthquake centered in western Montana rocked a 5-state area. The quake extensively damaged roads and structures and caused a massive landslide to slip into the Madison River Canyon backing up the river. Nine people were known to have been killed and many people were injured when rocks and trees came down on camp grounds, trailors, and campsites where people were sleeping.

Search, rescue, and rehabilitation were the main efforts during the days to follow.

Significant Lessons:

1. A logical first reaction was to notify the State CD Director in Helena. The CD Director in turn notified the Highway Department, State Patrol, Aeronautics Commission, Fish and Game Department, and the Governor's Office.

2. "Ham" radio operators in the quake area helped by relaying the early reports and messages on the disaster.

3. The first general meeting of all participating agencies was held nearly 20 hours after the quake hit. However, even before the meeting, the agencies assigned civil defense duties and the public service organizations went to work on things that needed to be done.

4. One agency (Forest Service) coordinated overall on-the-ground action. CD Director was designated as State Coordinator by the Governor.

E. Hurricane Carla, September 3-14, 1961, by Mattie E. Treadwell, OCD State Director for Field Operations (Texas), Region 5, Denton, Texas. December 22, 1961

Summary of Event:

A massive hurricane followed by isolated tornadoes struck the Texas - Louisiana coast on Monday, September 11, 1961 causing widespread damage but relative few deaths. The weather associated with the hurricane prevented rapid movement of the storm inland and allowed officials to carry out one of the largest civilian evacuation projects in the country's history, with nearly one million people being evacuated.

Significant Lessons:

1. In spite of backup by Federal and state resources, the final responsibility for decisions affecting citizens' lives falls upon the local official.

2. Local communities must spell out who is responsible for making certain decisions during emergency periods and establish a definite line of authority.

3. Decision for evacuation was left up to the local officials, not the state, with advisory support from the Weather Bureau.

4. Accurate weather forecasts were helpful in preparing for evacuation just as they would be helpful in predicting fallout for evacuation purposes.

5. State and local officials felt that evacuation plans should be prepared and updated to handle (a) strategic evacuation during international stress (b) tactical evacuation of fallout areas if shelter is lacking and (c) evacuation of survivors from target areas after an attack.

6. Local officials expressed a need for a National Guard or other Military unit to be precommitted to specific communities in the event of enemy attack.

7. As a means of getting heavy equipment to work locally on clean-up, the state employed the Associated General Contractors "Operation Bulldozer". This plan is designed for enemy attack and furnishes equipment coordinators that locate heavy equipment from the nearest member firm of AGC.

8. Fuel for power generator operation should be provided. CD communications equipment must have a two-weeks supply of fuel for emergency generators as a prerequisite for obtaining matching funds for communication equipment.

9. Concerning Emergency Operating Centers:
   (a) Emergency operations out of police dept. not practical.
   (b) Plan and designate adequate space in one building to handle top command for the disaster.
   (c) Make provisions for shift work.

10. Local observers felt that shelters should be provided for the families of members of the disaster organization - "or you can't expect them to stay". Comments appear applicable to enemy attack.

11. Concerning Communications:
   (a) States regarded Federal CD communications system as inadequate to handle load larger than Carla.
   (b) State level communications proved adequate.
   (c) Most of the local political subdivisions with a paid CD director had adequate communications.
   (d) In all areas much reliance was placed on telephone communications.

12. Local officials strongly recommended the establishment of a command communications net that would connect state CD headquarters to both area and local offices to be used as an "executive" net, not for bulk messages.

13. Preplan public emergency information services to effectively disseminate information.

14. Galveston requested use of fire trucks to replace some of their trucks out of commission due to silt and low city water pressure. State was unable to locate any trucks from neighboring cities that could be spared and the request was filled by the Military.

F. The Vaiont Dam Disaster Working Paper No. 1, by E. L. Quarantell: and J. Eugene Haas, Dept. of Sociology, Disaster Research Center, Ohio State University, Columbus

Summary of Event:

On October 9, 1963 at 10:40 p.m. a hugh landslide slipped into an artificial lake causing a huge volume of water to crest over an 873 foot high dam. The water descended on the village of Longarone, Italy and several other small towns killing between 2,500 and 3,500 people. Rescue operations were headed by Military units from surrounding areas.

Significant Lessons:

1. Subsequent threats of flooding prompted police to forcefully evacuate people from certain areas. These people returned to these areas only to be forcefully evacuated the following day.

2. There needs to be a clear-cut definition of command responsibility for disaster situations. The civil authorities were legally in charge of the post-disaster area but the Italian Army assumed the command role because (1) they had always been expected to do so, and (2) the civil authorities were reluctant to take over. The Army publicly denied statements issued by the press saying that they had superseded the civil authorities.

3. This disaster emphasizes the need to develop a pre-arranged system for collecting information, and prompt, responsible reporting of facts associated with the disaster.

4. The handling of dead bodies evoked more criticism than most anything else connected with the disaster.

5. Pre-disaster planning was effective in quickly mobilizing medical facilities in areas where they were needed.

G. Organizational Response to an Explosion at Medina Atomic Energy Commission Base, San Antonio, Texas, by J. Eugene Haas, Department of Sociology, Disaster Research Center, Ohio State University, Columbus, Ohio, Nov. 13, 1963

Summary of Event:

At approximately 10:24 a.m. on November 13, 1963 an explosion occurred at the Medina Atomic Energy Commission Facility outside San Antonio, Texas. The explosion caused minor damage 10-15 miles away. As a result of the explosion a dust cloud formed over the Facility Area - thought at first to be radioactive, but later determined to be safe.

Significant Lessons:

1. San Antonio OCD activated Emergency Control Headquarters and emergency plans. Continued until emergency was over - coordinated information going out over radio and TV.

2. Police responded before the Emergency Control Headquarters was activated to control traffic at the scene.

3. San Antonio Fire Department responded immediately in accordance with pre-arranged plan to go to the blast area if needed and fill in behind these units with standby equipment.

4. Radio, TV, and newspapers played a significant role in disseminating information about the explosion after they received the official reports.

5. This incident substantiated the previous finding by the NFCS that organizations tend to plan for about the level of emergency that they have previously experienced and ignore the unexpected.

6. Communications arrangements were inadequate because city officials and civil defense personnel were not notified as to the seriousness of the situation, particularly with regard to the threat of radioactive fallout.

7. When the Medina Facility was constructed, an intensive public education program put on by the AEC had emphasized clearly that although the probability was low, an explosion or fire could spread radioactive materials in the air. In spite of this educational effort hundreds of people converged on the scene shortly after the blast - disregarding the possibility of fallout.

H. The Los Angeles Fires of March 16, 1964, by C. M. Countryman, PSW Forest and Range Experiment Station, Research Note 46, 1964

Summary of Event:

On March 16 and 17, 1964, three fires near the edge of Los Angeles burned 11,650 acres and destroyed 20 homes - more homes were damaged and threatened. High winds were a major contributing factor to the spread and an unusual number of spot fires added to the control difficulty.

Significant Lessons:

1. Even with the most sophisticated of fire control organizations, multiple fires can quickly develop into situations where there just isn't enough man power and equipment to do the job.

2. When fire suppression forces must be diverted to protect structures, the fire may continue to spread in natural fuels. Firefighting forces should be increased to meet this need.

I. The Role of the Office of Emergency Planning in the Alaskan Earthquake, A report to the President by Edward A. McDermott, Director, OEP, September 1964

Summary of Event:

The Alaskan Earthquake of March 27, 1964 produced major damage to homes, harbors, transportation systems, and public utilities over an area of about 50,000 square miles. Nearly half the population of Alaska live in the area directly affected. Casualties were light but property losses were estimated over $300 million.

Significant Lessons:

1. The OEP Regional Director for the Pacific Northwest coordinated the immediate disaster relief efforts of the Federal Government, and consulted with state officials concerning further assistance if a "major disaster" were declared.

2. "Major disaster" declared by President in response to a request from the Governor and on the recommendation of OEP. Under Federal Disaster Act, PL 81-875.

3. When declared a "major disaster" the OEP is authorized to direct and coordinate assistance by other Federal agencies, and to administer funds allocated from the President's Disaster Fund.

4. OEP assigned specific missions to individual agencies consistent with their day-to-day responsibilities.

J. The Alaskan Earthquake by Office of Civil Defense, Secretary of the Army, Department of Defense, May 1964

Summary of Event:

(Same description as for previous Alaskan Earthquake Report)

Significant Lessons:

1. The loss of utilities (gas, water, sewer, electricity, and telephones) will be a serious threat to rapid recovery from a natural or wartime disaster. It would be further complicated with the advent of fallout.

2. Independent action by city departments and individuals was successful in helping to handle search and rescue, evacuation, security, emergency feeding, shelter and registration.

3. The Mayor, City Manager, and Anchorage Civil Defense Director each had specific jobs to do. The CD Director coordinated emergency actions for the City Manager. City department heads, directors of organizations, and Military support groups reported to the CD Director for assignments.

4. Emergency operations were coordinated in a temporary E.O.C. where all top city officials, including the CD Director, worked together. Both city and state CD offices were damaged by the quake.

5. The Anchorage CD Director had a functioning organization within about 12 hours.

6. The Anchorage CD Director emphasized two specific needs: (1) to have a news release control station and (2) to have a central morgue for quick identification and accurate count of casualties.

7. The "RACES" organization (Radio Amateur Civil Emergency Services) made the first effort to establish communication after the quake. Contacts were made with three mobile units 11 minutes after the quake hit. The Deputy RACES Officer made the first announcements of the quake.

8. The 10,000 watt CD Emergency Broadcast Station was back on the air 20-30 minutes after the quake using an emergency generator. Help was provided by RACES and Military units.

9. Emergency generators were widely used to restore heat, lights, and communications.

10. Military assistance consisted of providing communication units, mobile mass-feeding kitchens, emergency generators.

11. Military assistance was provided to both city and state CD organizations. The Alaska National Guard provided personnel and equipment under State CD coordination.

12. Communications network functioned as follows:

    The Warning Officer for the OCD National Warning System was stationed at Elmendorf Air Force Base;

    He received messages relayed through a mobile RACES unit just outside his door, and direct from both Anchorage and State CD Headquarters, Fort Richardson and outlying areas;

    National Warning System provided the first civilian situation report to the Pentagon through the OCD Public Information.

13. The State Adjutant General worked directly with State CD Headquarters and relayed requests for aid to Army, Air Force, and Navy units. An Army liaison unit was set up in the Anchorage CD Headquarters.

K. Some Preliminary Observations on the Responses of Community Organizations Involved in the Emergency Period of the Alaskan Earthquake, by R. R. Dynes, J. E. Haas, & E. L. Quarantell: Disaster Research Center, Ohio State University, Columbus, May 28, 1964

Summary of Event:

The Good Friday Earthquake of March 27, 1964 that hit Alaska caused widespread damage to the Anchorage area and outlying areas of Seward, Kodiak, and Valdez. In spite of the heavy damage to these communities, there were few casualties and few fires, and most of the disaster organizations - both voluntary and non-voluntary, were able to mobilize their full compliments. There was a period of time when most of the areas were without water and electricity except for limited auxiliary sources.

Significant Lessons:

1. The quake extensively disrupted telephone, water, gas, sewer, and electric services. This resulted in destruction of established lines of communication, put radio and TV out of commission, stopped newspaper presses, drained water lines, made sewer systems inoperative, and eliminated most of the main heat source (gas) to the area.

2. Mobile radio equipment (service trucks, police, mobile ham units) and messengers were the main means of communication early in the disaster.

3. There was no central location where specific information concerning the disaster could be channeled until the local CD unit became fully operative. Information coming in was not communicated to others needing the knowledge and organizations maintained few records of their communications.

4. Emergency organizations tended to work independently without coordinating their efforts with other organizations. Telephone and electrical service units were so involved in their normal tasks, they were unable to recognize this need in the early stages of the disaster.

5. From the beginning, the state CD Director was instructed by the Governor to coordinate activities of state officials at the state level.

6. Pre-existing personal friendships were important in coordinating efforts of organizations in the absence of pre-arranged plans.

7. There were no local organizations that had explicit plans to handle natural disasters. The local CD plan for wartime was incomplete and not well known.

8. The state CD adapted their wartime plan to fit the natural disaster. The transition went smoothly at the state level.

9. CD stockpiles were known about and were used to good advantage.

10. Martial law was not needed nor was it declared. The Military worked well under general directions of civil authorities.

11. There was only one minor fire in Anchorage the night after the quake. Major fires would have been difficult to control because water was out of the lines. Only 1100 gallons were available in tank trucks.

12. The emergency control center for the local CD unit was made inoperable when the fluorescent lighting was shattered by the quake.

13. Emergency lighting of key buildings provided some central locations where people could converge to volunteer their services.

14. Nearby Military bases provided a source of manpower that was more than adequate to supplement the civilian disaster workers.

15. The fire department, anticipating major fire difficulties, "stocked" dozens of volunteers at one location in the immediate emergency period. No fires developed and they were not used.

16. Emergency organizations should prepare plans to utilize volunteer help that is available during periods of disaster.

L. Aesop 1964, Contingencies Affecting the Issuing of Public Disaster Warnings at Crescent City, California, by Daniel Yutzy, Department of Sociology, Disaster Research Center, Ohio State University, Columbus, Ohio, May 21, 1964

Summary of Event:

As a result of the March 27, 1964 Alaskan Earthquake, emergency warnings were issued by the California Disaster Office to all police and CD officials of California coastal counties and cities that a "tital" wave was probable but unconfirmed. Local officials then had the task of carrying this alert to the public in the various areas to protect life and property. Two warnings were issued by the CDO; the first at 11:08 p.m., the second at 11:50 p.m.. The seismic wave was expected at 12midnight. The first arrived right on schedule (12 midnight) followed by a second at 12:40 a.m., a third at 1:20 a.m., and the fourth at 1:45 a.m. The first three were mild, the fourth caused major damage.

Significant Lessons:

1. Seismic wave alerts are a common occurrence. Fortunately, most of the alerts have resulted in no damage or only minor damage but the public officials must decide whether to simply alert, or alert and evacuate the people that might be affected.

   This situation points up the need for a much improved intelligence system for determining the occurrence, size, and time of arrival of seismic waves in sea coast towns. In a more general way, it emphasizes the importance of finding a means by which public officials can be provided with accurate information concerning prediction and assessment of all types of disasters.

M. Public Utilities Vs. Fire, News clippings from Los Angeles Times, September 27, 1964, covering Public Utility Co. activities on Coyote Fire

Summary of Event:

The Coyote fire on the Los Padres National Forest burned over 73,000 acres causing roughly $20 million dollars damage. Nearly 80 structures were damaged or destroyed, one firefighter was killed and there were 61 burn cases and several major injuries.

Significant Lessons:

1. Private utility companies (electric, gas, and telephone) responded to the Santa Barbara area where the fire was burning.

2. Utility companies can provide a large variety of services and equipment to aid in control of the fire and support of command.

3. Equipment available for use included dozers, helicopters, trucks and tank trucks used for washing insulators on high tension lines.

4. Public Utility Companies have no legal liability to furnish service to customers in the event of a natural disaster. However, they generally do the best they can to restore services.

N. Hurricane Dora 1964, by Department of Defense, Office of Civil Defense, September 1964

Summary of Event:

A large tropical hurricane moved into the southeastern United States in September 1964 causing widespread damage, death, and injury. An annex to the report covers hurricane "Cleo" which closely preceded "Dora". Cleo caused more than $100,000 damage and killed 130 persons - mostly in the Caribbean.

Significant Lessons:

1. Warning stations on the Civil Defense National Warning System were used effectively for communications, and an alternate CD headquarters was manned in case communications were cut off from the main headquarters.

2. Low incidence of injuries and fatalities due to citizens heeding the hurricane warnings and keeping in touch with broadcast weather changes by using transistor radios.

3. The State CD Office issued advice and guidance to the local CD offices, and received information in return, by using the entire Florida NAWAS circuit of 25 stations.

4. Key O.E.C. should have an alternate, emergency power source for communications.

5. A community prepared to at least partially cope with a nuclear disaster, is well prepared to react to natural disasters.

O. Fire From the Sky over Wichita, Report by Chief T. A. McGaughey pp 91-95, Proceedings Fire Dept. Inst. Conference, Memphis, March 1965

Summary of Event:

On January 16, 1965 a KC-135 air tanker loaded with fuel crashed on take off in a suburban residential area in the northeast section of Wichita. The plane exploded on impact scattering burning fuel and debris over a 200,000 sq. ft. area. Eleven houses were destroyed, and 30 lives lost.

Significant Lessons:

1. Citizens responded to provide welcome help in handling hose during the emergency.

2. A workable disaster plan is needed that can be expanded upon to handle a disaster larger than might be expected.

3. A Heavy Rescue and Fire Reserve force made up of 120 citizen volunteers train regularly, and are equipped with clothing, tools, and insurance to aid with multiple alarm fires and other emergencies.

4. Preparation of successful disaster plans are the result of Pre-planning, Organizing, Training, and Review & Updating.

5. Successful coordination of a disaster operation requires that:
   (a) Jurisdictional command be established.
   (b) Each agency knows where they fit in and who will notify which agency.